Configuring IP SLA - Percentile Support for Filtering Outliers

This module describes how to configure the percentile option for IP SLAs to examine a set of network measurements that are within a specified percentile of the return packets. This feature improves Cisco IP Service Level Agreements (SLAs) by providing the capability to measure round-trip times within a percentile, such as the 95th percentile of RTT, in order to examine a set of measurements that are 95% faster and 5% slower.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Information About IP SLA - Percentile Support for Filtering Outliers

Percentile Measurements

The IP SLA- Percentile Support for Filtering Outliers feature enables IP SLAs to calculate min/average/max values for all packets, excluding those with the highest x% measured value. For example, if you have a ten-packet probe with nine 1-ms RTT values and one 50-ms RTT value, the percentile will exclude the outlier (50-ms) and report a min/avg/max value of 1/1/1, not 1/5/50.

IP SLAs reactions are configured to trigger when a monitored value exceeds or falls below a specified level. If IP SLAs measures too high or too low for any configured reaction, IP SLAs can generate a notification to a network management application or trigger another IP SLA operation to gather more data. The percentile reactions work the same way except that the monitored value is the percentile min/max/average. A count is keep of all the packets that violate the threshold value and at the end of the operation, that value is subtracted from the total packets received, then divided by the total, and a success ratio is generated. This value is referenced by a new reaction type that generates a notification when a percentage ratio is not met. For information, see the **ip sla reaction-configuration** command in the IP SLAs Command Reference.

How to Configure IP SLA - Percentile Support for Filtering Outliers

Configuring the IP SLAs Responder on a Destination Device

Note   A responder should not configure a permanent port for a sender. If the responder configures a permanent port for a sender, even if the packets are successfully sent (no timeout or packet-loss issues), the jitter value is zero.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. Enter one of the following commands:
    - **ip sla responder**
    - **ip sla responder udp-echo ipaddress** *ip-address* **port** *port*
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

Step 3	Enter one of the following commands:
	
	• **ip sla responder**
	
	• **ip sla responder udp-echo ipaddress** *ip-address* **port** *port*
	
	Example:
	
	`Device(config)# ip sla responder`
	
	`Device(config)# ip sla responder udp-echo ipaddress 192.0.2.132 port 5000`
		(Optional) Temporarily enables IP SLAs responder functionality on a Cisco device in response to control messages from the source.
		
		(Optional; required only if protocol control is disabled on the source.) Enables IP SLAs responder functionality on the specified IP address and port.
		
		• Protocol control is enabled by default.

Step 4	**end** **Example:** `Device(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.

Configuring an IP SLAs Operation Using the Percentile Option

Before You Begin

- The IP SLAs operation to be configured for percentile support must be configured on the source device. For configuration information, see the appropriate module in the *IP SLAs Configuration Guide*. The percentile option can be configured for the following IP SLAs operations:

    ○ Ethernet jitter—See the "Manually Configuring an IP SLAs Ethernet Ping or Jitter Operation on the Source Device" section of the "Configuring IP SLAs for Metro-Ethernet" module.

    ○ ICMP jitter—See the "Configuring Cisco IP SLAs ICMP Operations" module.

    ○ UDP jitter—See the "IP SLAs UDP Jitter Operations" module.

• For a UDP jitter operation, an IP SLAs responder must be configured on the destination device. For configuration information, see the "Configuring an IP SLAs Responder on the Destination Device" section.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip sla** *operation-number*
4. **percentile** {**jitteravg** | **jitterds** | **jittersd** | **owds** | **owsd** | **rtt**} *percent*
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ip sla** *operation-number* **Example:** `Device(config)# ip sla 10`	Begins configuration for an IP SLAs operation and enters IP SLA configuration mode. **Note** For the purpose of this configuration task, the operation to be configured for percentile support is a preconfigured ICMP jitter operation.
Step 4	**percentile** {**jitteravg**	**jitterds**	**jittersd**	**owds**	**owsd**	**rtt**} *percent* **Example:** `Device(config-ip-sla-jitter)# percentile jitteravg 95`	Configures the percentile option for an IP SLAs operation.
Step 5	**end** **Example:** `Device(config-ip-sla-jitter)# end`	Returns to privileged EXEC mode.

Scheduling IP SLAs Operations

Before You Begin

- All IP Service Level Agreements (SLAs) operations to be scheduled must be already configured.

- The frequency of all operations scheduled in a multioperation group must be the same.

- The list of one or more operation ID numbers to be added to a multioperation group must be limited to a maximum of 125 characters in length, including commas (,).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. Enter one of the following commands:

   - **ip sla schedule** *operation-number* [**life** {**forever** | *seconds*}] [**start-time** {[*hh***:***mm***:***ss*] [*month day* | *day month*] | **pending** | **now** | **after** *hh***:***mm***:***ss*}] [**ageout** *seconds*] [**recurring**]

   - **ip sla group schedule** *group-operation-number operation-id-numbers* {**schedule-period** *schedule-period-range* | **schedule-together**} [**ageout** *seconds*] [**frequency** *group-operation-frequency*] [**life** {**forever** | *seconds*}] [**start-time** {*hh***:***mm* [**:***ss*] [*month day* | *day month*] | **pending** | **now** | **after** *hh***:***mm* [**:***ss*]}]

4. **end**
5. **show ip sla group schedule**
6. **show ip sla configuration**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	Enter one of the following commands: • **ip sla schedule** *operation-number* [**life** {**forever**	*seconds*}] [**start-time** {[*hh***:***mm***:***ss*] [*month day*	*day month*]	**pending**	**now**	**after** *hh***:***mm***:***ss*}] [**ageout** *seconds*] [**recurring**]	• Configures the scheduling parameters for an individual IP SLAs operation. • Specifies an IP SLAs operation group number and the range of operation numbers for a multioperation scheduler.

Command or Action	Purpose

• **ip sla group schedule** *group-operation-number operation-id-numbers* {**schedule-period** *schedule-period-range* | **schedule-together**} [**ageout** *seconds*] [**frequency** *group-operation-frequency*] [**life** {**forever** | *seconds*}] [**start-time** {*hh***:***mm* [**:***ss*] [*month day* | *day month*] | **pending** | **now** | **after** *hh***:***mm* [**:***ss*]}]
 	
Example:
 	
`Device(config)# ip sla schedule 10 life forever start-time now`
 	
`Device(config)# ip sla schedule 10 schedule-period frequency`
 	
`Device(config)# ip sla group schedule 1 3,4,6-9 life forever start-time now`
 	
`Device(config)# ip sla schedule 1 3,4,6-9 schedule-period 50 frequency range 80-100`	

Step 4 **end** **Example:** `Device(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.
Step 5 **show ip sla group schedule** **Example:** `Device# show ip sla group schedule`	(Optional) Displays IP SLAs group schedule details.
Step 6 **show ip sla configuration** **Example:** `Device# show ip sla configuration`	(Optional) Displays IP SLAs configuration details.

Troubleshooting Tips

- If the IP Service Level Agreements (SLAs) operation is not running and not generating statistics, add the **verify-data** command to the configuration (while configuring in IP SLA configuration mode) to enable data verification. When data verification is enabled, each operation response is checked for corruption. Use the **verify-data** command with caution during normal operations because it generates unnecessary overhead.

- Use the **debug ip sla trace** and **debug ip sla error** commands to help troubleshoot issues with an IP SLAs operation.

What to Do Next

To add proactive threshold conditions and reactive triggering for generating traps (or for starting another operation) to an IP Service Level Agreements (SLAs) operation, see the "Configuring Proactive Threshold Monitoring" section.

Verifying IP SLAs Operations

Perform this task to display and interpret the results of an IP SLAs operation. Check the output for fields that correspond to the criteria in your service level agreement to determine whether the service metrics are acceptable.

SUMMARY STEPS

1. **enable**
2. **show ip sla statistics**

DETAILED STEPS

Step 1 **enable**

Enables privileged EXEC mode.

- Enter your password if prompted.

Example:

```
Device> enable
```

Step 2 **show ip sla statistics**

Displays and interprets the results of an IP SLAs operation.

Example:
```
Device> show ip sla statistics
```

Configuration Examples for IP SLA - Percentile Support for Filtering Outliers

Example: Configuring IP SLA - Percentile Support for Filtering Outliers

The following example shows how to configure an IP SLAs ICMP jitter operation with the percentile option:

```
ip sla 1
 icmp-jitter 192.168.0.129 interval 40 num-packets 100 source-ip 10.1.2.34
 percentile jitteravg 95
!
ip sla reaction-configuration 1 react jitterAvgpct threshold-value 5 2 action-type trap
threshold-type immediate
!
ip sla schedule 1 start-time now life forever
```

Additional References for IP SLA - Percentile Support for Filtering Outliers

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Cisco IOS IP SLAs commands	IP SLAs Command Reference
Cisco IP SLAs configuration tasks	*IP SLAs Configuration Guide*

Standards and RFCs

Standard/RFC	Title
• CISCO-RTTMON-MIB • CISCO-RTTMON-ICMP-MIB	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for IP SLA - Percentile Support for Filtering Outliers

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for IP SLA - Percentile Support for Filtering Outliers

Feature Name	Releases	Feature Information
IP SLA - Percentile Support for Filtering Outliers		This feature improves Cisco IP Service Level Agreements (SLAs) by providing the capability to measure round-trip times within a percentile, such as the 95th percentile of RTT, in order to examine a set of measurements that are 95% faster and 5% slower. The following commands were introduced or modified: **ip sla reaction-configuration**, **percentile**, **show ip sla statistics**